

FOREST CONTROL

A132:
In 81
120

by CONTINUOUS INVENTORY

"Today I have grown taller from walking
with the trees."

...Karle Wilson

Milwaukee, Wis. March, 1964 No. 120

"He is well
paid that is
well satisfied"

Wm. Shakespeare
1564 - 1616

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DETAILED IN-PLOT TIME RECORDS FOR 49 OUT OF 75 REMEASURED PLOTS
IN STONE'S WOODS

Time studies for each of the component parts of the continuous inventory job are long overdue, but we have little time to work on this phase of CFI. Each season we see evidence of striking variance in the efficiency of individuals taking plots. Their methods differ too, and this is to be expected, for the practice of inventory in the forest, like the practice of silviculture, is an art which must be learned by doing. This does not imply that absolute uniformity of technique and method is necessary. I would not, in my declining years, be so demanding. It does mean, though, that the principal elements of the work need to be isolated, timed by stop watch and analyzed so that extreme differences in the time of cruising may be somewhat toned down. Some day, with the help of the forest industries, the Division of State and Private Forestry will undertake administrative studies in this field. In the meantime, it seems desirable to set down some preliminary results of time studies already completed.

I have made a somewhat more intensive exploration of the time for plot work in 49 of the samples in Stone's Woods, grouping them by major product classes and summing up the time and tree count. The four groups include:

1. The predominantly sawlog plots
2. The predominantly cordwood plots
3. The plots with many cut and dead trees
4. The plots with a mixture of all products

From the results of this segregation it is possible to draw certain conclusions, but keep in mind that these are the first tottering steps toward more thorough time records later. These data concern cruising time within plot only, using a one-man crew.

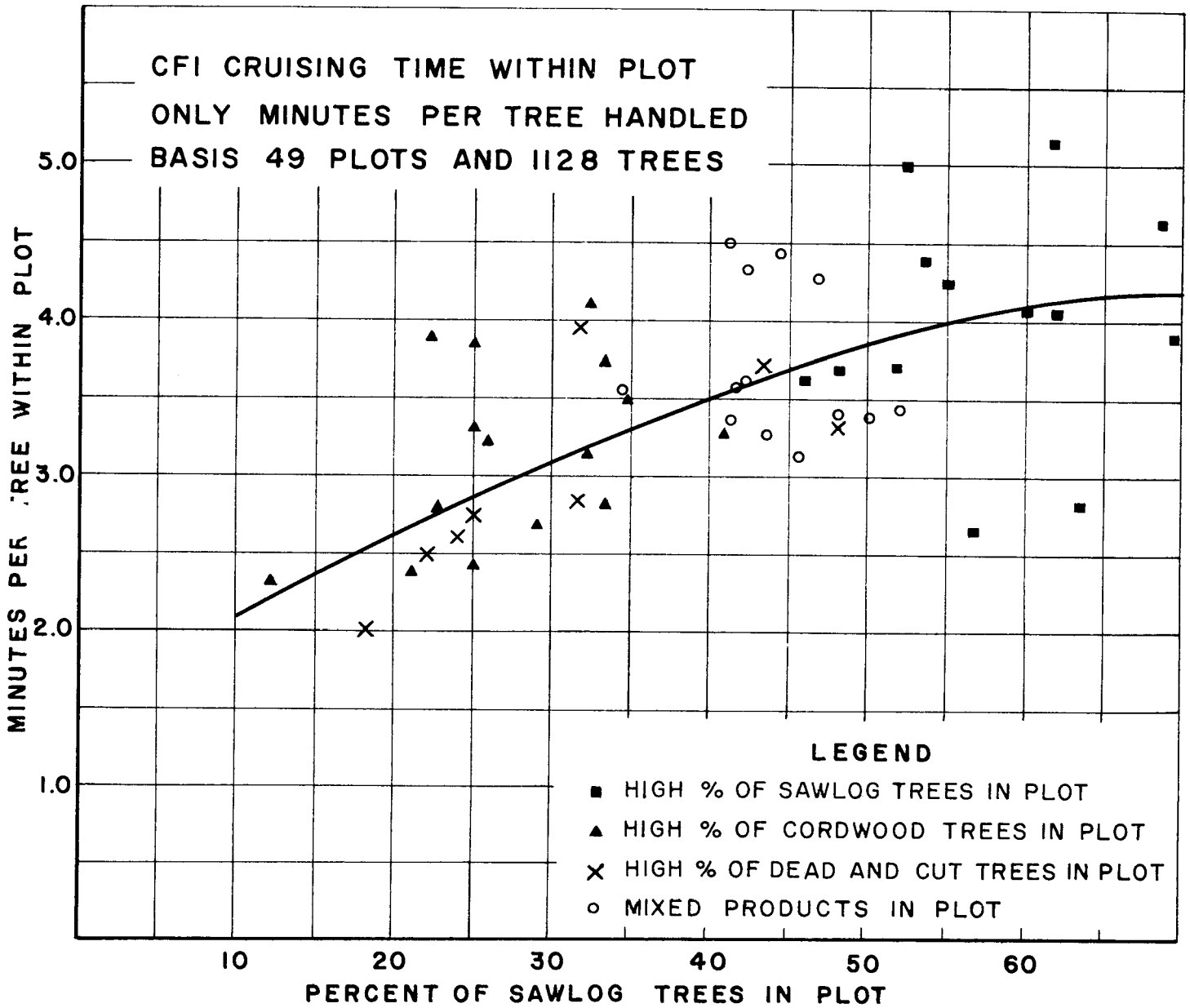
SAWLOG TREES TAKE THE MOST IN-PLOT TIME AND SKILL IN SOLO CFI

The CFI cruiser working alone soon finds that his most troublesome and time-consuming task is the measurement of sawlog timber stands. There are clearcut reasons for this:

1. Sawlogs have a high value and demand refined work.
2. Many hypsometer measurements for length are needed.
3. Top merchantability limits are difficult to decide.
4. Cull decisions require much time, care and training.
5. DBH measurements on the large trees must be precise.
6. Factory log grading demands close examination.

The records clearly show that one man cruising time increases with the proportion of sawlog trees in the plot. The time per tree doubles when the proportion of sawlog trees in the stand increases from 10% to 70%. The graphic picture on the next page helps to make this correlation clear. This graph and the table of values of "Solo Cruising Time Within Plot" are helpful tools when planning the time for new CFI field projects.

Solo Cruising Time Within Plot	
Sawlog Trees Percent	Time Per Tree Minutes
10	2.1
20	2.6
30	3.1
40	3.5
50	3.8
60	4.1
70	4.2



SEGREGATION OF TIME RECORDS WITHIN PLOT BY PRODUCT GROUP

The classification of plots within product groups is broad but the selection of plots and the grouping were unbiased. This accounts for the large individual plot time variations. Some plots are far above and below the average time of 3.41 minutes per tree for the 1,128 trees in these 49 samples.

When sawlog trees predominate in the product groups shown in the platted graph the in-plot time for all trees handled is 3.88 minutes per tree. This average drops to 3.10 minutes for predominantly cordwood trees, to 2.94 minutes per tree when a third of the trees are dead or cut, and to 3.67 minutes per tree with a fairly constant mixture of sawlog and cordwood trees. Detailed time results for these segregations follow:

THE IN-PLOT TIME RECORD BY PRODUCT GROUPS*
AVERAGE TIME FOR 1128 TREES

3.41 MINUTES PER TREE

<u>THIRTEEN PLOTS CONTAINED PREDOMINANTLY SAWLOG TREES</u>			<u>FIFTEEN PLOTS CONTAINED PREDOMINANTLY CORDWOOD TREES</u>		
<u>PRODUCT</u>	<u>TREE COUNT</u>	<u>% OF TOTAL TREES</u>	<u>PRODUCT</u>	<u>TREE COUNT</u>	<u>% OF TOTAL TREES</u>
Sawlog trees	157	57.1	Sawlog trees	103	27.4
Cordwood trees	83	30.2	Cordwood trees	220	58.5
Dead or cut trees	35	12.7	Dead or cut trees	53	14.1
Totals	275	100.0	Totals	376	100.0
MINUTES PER TREE 3.88			MINUTES PER TREE 3.10		
<u>THIRTEEN PLOTS CONTAINED MIXED PRODUCTS</u>			<u>EIGHT PLOTS CONTAINED ONE-THIRD DEAD AND CUT TREES</u>		
<u>PRODUCT</u>	<u>TREE COUNT</u>	<u>% OF TOTAL TREES</u>	<u>PRODUCT</u>	<u>TREE COUNT</u>	<u>% OF TOTAL TREES</u>
Sawlog trees	126	44.2	Sawlog trees	58	30.2
Cordwood trees	130	45.6	Cordwood trees	65	33.9
Dead or cut trees	29	10.2	Dead or cut trees	69	35.9
Totals	285	100.0	Totals	192	100.0
MINUTES PER TREE 3.67			MINUTES PER TREE 2.94		

* Includes time within plot only. Travel in car and to and from plots excluded

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U. S. Forest Service

FACTORS INFLUENCING THE TIME STUDY FOR SOLO CFI IN STONE'S WOODS

EQUIPMENT USED TO REMEASURE STONE'S WOODS PLOTS WITH A ONE-MAN CREW

1. CAR TRAVEL TO WOODS GATE

The round trip by car to Stone's Woods gate was 58 miles. County roads limited the speed to an average of 38 miles per hour. Each evening the trip home was made after dark. Weather conditions favorable for car travel prevailed throughout the project.

The total car travel time to and from the woods gate was 70 1/2 miles. One overnight stay was made in the woods.

2. FOOT TRAVEL BETWEEN PLOTS

The distance walked outside of the plots each day approximated one-half mile. It included travel to and from the car and between plots and plot lines. Plot centers were set at two-chain intervals. There was no lost time hunting for center stakes and walking conditions were good, with very little brush and windfall to interfere.

Although not exactly measurable, the estimated foot travel in 13 working days was 7 miles.

3. FOOT TRAVEL WITHIN PLOTS ONLY

It is estimated that the daily walking distance within plots was one and one-half miles. It is believed that this is a fairly accurate figure since the number of trees per plot is known and the plot radius is constant. Travel from tree to tree was progressive, interrupted only by the measurement of distances to hypsometering points for tall trees.

There were 20 miles of in-plot travel on foot. This walking and the related work required 7 1/2 of the one-man crew's time. The work included all of the duties and tree diagnoses necessary for C.F.I. within 75 plots. *

4. QUALITY OF WORKMANSHIP

No unusual pressures of any kind were allowed to influence the refinement and quality of the work done. Although the working day was somewhat longer than normal, there was no undue haste and measurements and judgments were thoroughly made. Steady and careful working habits governed the project from start to finish. In spite of the care taken, there will be errors found for it seems impossible to eliminate them completely in any human undertaking.

5. DESCRIPTION OF AREA STUDIED

The project area was the 1 1/2 acre Stone's Woods near North Lake, Wisconsin, about 30 miles northwest of Milwaukee. The tract is well stocked with oak-mixed hardwoods on rolling to moderately hilly glacial moraine soil. The stand is predominantly sawlog timber 100 to 120 years old. Red oak is the chief species.

6. TIMBER PRODUCTS AND VOLUMES

Selective cutting, mortality and growth are constantly changing the volumes in this forest, and no recent calculation of the average stand has been made. The plots have sawtimber volumes which range from 3,000 to 12,000 board feet net Scribner per acre. The approximate average net volume is 6,000 board feet per acre. There is in addition a cordwood volume of from 5 to 6 cords per acre in non-sawlog trees.

7. NUMBER OF TREES IN PLOTS

The tree cards total 1,680 for these 75 sample plots. This year there are 695 sawlog trees over 11" in diameter, and 689 cordwood trees 7" and larger. Tree cards for cut and dead trees accumulating over 18 years number 296. There are 184 living trees in the average plot and 4 additional cut or dead trees. The largest tree is 32" in dbh.

8. PLOT ARRANGEMENT

The circular, fifth-acre samples are spaced 2 chains apart on 11 east and west plot lines through the area. The plot lines vary from 2 to 4 chains apart. Distances between plots and strips were originally paced and are somewhat irregular but completely unbiased.

Each plot has a steel center stake driven to ground level and witnessed by numerous painted trees and shrubs. All trees have been numbered from the beginning and the plots are perfectly visible.

9. TIME OF YEAR AND WEATHER CONDITIONS DURING MEASUREMENTS

The Stone's Woods plots were measured when time was available between October 11 and November 15, 1963. Temperatures ranged from 84° Fahrenheit in October to a low of 21° Fahrenheit in November. Moderate showers fell during two of the 13 days, delaying work slightly. The records were made following a period of May and early June drought. Occurring at the peak of the normal growing season, this lack of rain caused a noticeable decline in DBH growth, particularly for trees which were below average vigor. The annual rainfall was 19.10".

Leaf fall began late in October and continued on an increasing scale through November. During the last half of the mensuration work the condition of the upper bole and its length could be determined with far greater ease than at the beginning of the period.

* Refer to February, 1963 Newsletter No. 107 for coding scheme.

** Refer to August, 1963 Newsletter No. 113 for Improved Template for Port-A-Punch boards.

1. STANDARD 20-FOOT DIAMETER TAPE

Measurements made to hundredths of inches and compared with previous record. Hook end of tape covered with black plastic tape.

2. PORT-A-PUNCH BOARD AND TEMPLATE **

All records punched as taken on individual PAP cards. Unnecessary template holes were pasted over. Extra stylii available at all times.

3. FIFTH-ACRE PLOT TAPE FOR PLOT RADII

Tape with 8" pin fastened to zero end. Stuck in plot center and used chiefly for checking in-growth trees. The tape was coated with yellow spray enamel and marked at the pin end with blue plastic ribbon to improve visibility. Tape end notched to show that no breakage had occurred.

4. FIFTH-ACRE PLOT TAPE FOR MEASURING TO HYPSEMETERING POINTS

This is a similar tape but marked at the 50-foot point. The pin was stuck into the ground at the base of the tree and straightened out beneath the arm when advancing toward the 50-foot point at which the usable length was taken. Sometimes two hypsometering points were needed at right angles to the tree. This tape was carried from tree to tree most of the time so as to be available when needed. Tape end notched.

5. UNJOINTED BAMBOO POLE 12 FEET LONG, WITH ADJUSTABLE 9" TO 1 1/2" CALIPER

Used to measure the top DOB of the butt log in sawlog trees. Two measurements made at right angles. Pole graduated in 2-foot intervals to facilitate the measurement of clear cuttings between defects in factory log grading. Carried or tossed from tree to tree.

6. BAMBOO POLE 24 FEET LONG WITH FIXED 4-1/2" CALIPER

Used to directly measure cordwood and cull trees under 35 to 40 feet in usable length. Caliper hung over limb or stub at 30 feet to aid in judging or measuring usable lengths above 30 feet for either cordwood or sawlog trees. Poles graduated in two-foot intervals to assist in measuring lengths to a full two-foot interval of bole. Pole carried from tree to tree. Extra 9" caliper carried in pack for use on sawlog trees but fastened to the 30-foot pole on occasion, to determine 9" DOB points on straight, clean boles.

7. HAGA HYPSETER FOR USABLE LENGTHS

Used for measuring trees with usable lengths greater than 35 to 40 feet. Haga used in all cases at a distance of 50 feet from the tree.

8. SOUNDING AXE -- 3/4 POUND SIZE

Carried to test the soundness of tree butts with evidence of rot or hollowness.

9. TIMBER CRUISER'S APRON

An absolute essential in solo CFI. It holds the Port-A-Punch board, stylus, pencils, codes, standards, tube paint, Brady correction seals, tape menders, and sometimes a Stanley snap back tape graduated in feet and inches.

10. PACK SACK

Most important purpose to carry lunch and thermos, but used also for extra equipment and spare parts, blank and completed PAP cards, manuals, rain gear, polyethylene sheet and a warm jacket.

SUMMARY OF RECORDS MADE AND PORT-A-PUNCHED IN THE COURSE OF THE NINETEENTH MEASUREMENT *

1. Plot number	These three items were prepunched and not repunched unless in error.
2. Tree number	Few errors. One tree card missing.
3. Species	
4. 1963 DBH	Measured and punched to hundredths.
5. 1963 tree quality on sawlog trees	Checked on sawlog trees. Top DOB calipered.
6. 1963 sawlog length on sawlog trees	Measured with 24-foot pole and gauge or Haga.
7. 1963 cordwood length on all trees	Measured with 24-foot pole and gauge or Haga.
8. 1963 sawlog soundness on sawlog trees	Checked and punched.
9. 1963 cordwood soundness on all trees	Checked and punched.
10. 1963 butt log length - sawlogs	Prepunched. Checked and changed if necessary.
11. 1963 butt off length - sawlog trees	Punched in X position where 2 feet and over.
12. 1963 tree vigor	Flash checked. Not weighted. Few changes.
13. 1963 tree status	Checked and punched.
14. 1963 management potential	Checked and punched.
15. 1963 stump age of cut trees	Ring counts made for 6 cut trees.
16. 1963 mortality kind	Punched for 11 dead and cut trees.
17. 1963 mortality year	Punched for 11 dead and cut trees.
18. Errors (E)	X-punched whenever found and corrected for previous record.
19. Fuelwood (F)	X-punched for trees cut and used for fuel.
20. Disease (D)	X-punched for oak wilt and Dutch elm disease.
21. 1963 ingrowth	Complete new cards punched for trees becoming 6.96" DBH and larger. These trees and occasionally others were tube paint numbered. Zeros punched in previous record fields. No missed trees found.
22. Special note	All errors in previous record fields were pasted over with red correction seals and punched correctly. All trees with fixed usable lengths were X-punched in standard column positions. No need to measure length again.
23. Comment	These remeasurements covered the same jobs which are also a standard part of plot establishment. All records compared for check. The only additional duties necessary at establishment are punching species, tree and plot number, setting and witnessing center stakes, completing plot master cards, and paint numbering trees.